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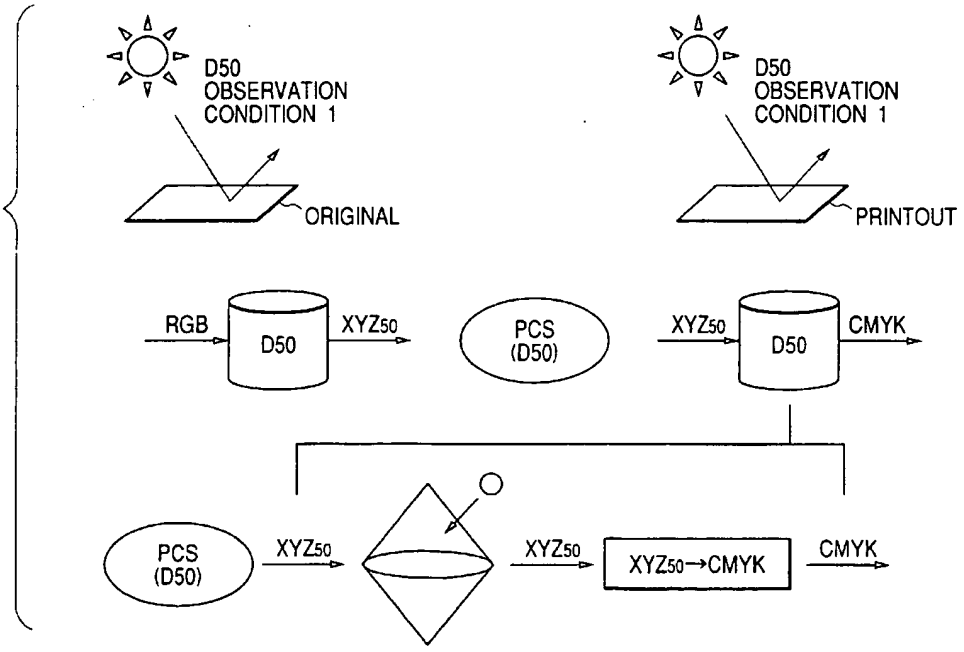
(54) Image processing method and apparatus

(57) An image processing method for inputting a color image signal and correcting the color image signal according to an observation condition, comprising the steps of: judging whether or not the input color image signal represents achromatic color; and controlling the correction according to the judged result, thereby enabling to excellently and satisfactorily perform color reproduction to achromatic color even under different observation conditions.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to image processing apparatus and method, and more particularly relates to image processing method and apparatus which perform correction according to an observation condition, and a recording medium.

Related Background Art

[0002] Fig. 1 is a conceptual diagram showing general color matching.

[0003] Input data (R, G and B data) is converted into X, Y and Z data in a color space independent of a device by an input profile. Since color outside a color reproduction range of an output device can not be represented by this output device, color gamut mapping is performed to the input data converted into the device-independent color space data such that all colors can be held within the color reproduction range of this output device. After the color gamut mapping is performed, the input data in the device-independent color space is converted into C, M, Y and K data in a color space dependent on the output device.

[0004] In the color matching, a standard white point and environment light are fixed. For example, in a profile defined by ICC (International Color Consortium), a PCS (profile connection space) for connecting profiles is represented by XYZ values and Lab values based on reference light D50. For this reason, when an input original and a printed output are observed under a light source of D50 characteristic, correct color reproduction is guaranteed. However, the correct color reproduction is not guaranteed under light sources of other characteristics.

[0005] In a case where an identical sample (e.g., an image) is observed under the different light sources, the XYZ values for the observed sample are naturally different from others. Thus, in order to predict the XYZ values under the different light sources, there are various conversion methods such as (1) a ratio conversion method, (2) a Von Kries conversion method, (3) a prediction expression method based on a color perception model, and the like.

[0006] In the ratio conversion method, in order to convert the XYZ values under a standard white point W1 into the XYZ values under a standard white point W2, ratio conversion of W2/W1 is performed. If this method is applied to an Lab uniform color space, an Lab value under the standard white point W1 coincides with an Lab value under the standard white point W2. For example, if the XYZ values of a sample under the standard white point W1(X_W1, Y_W1, Z_W1) are assumed to (X1, Y1, Z1) and the XYZ values of a sample under the standard white point W2(X_W2, Y_W2, Z_W2) are assumed to (X2, Y2, Z2), the following relation can be obtained by the ratio conversion method.

$$\begin{aligned} X2 &= (X_w2/X_w1)\cdot X1 \\ Y2 &= (Y_w2/Y_w1)\cdot Y1 \\ Z2 &= (Z_w2/Z_w1)\cdot Z1 \end{aligned} \qquad \ldots (1)$$

[0007] In the Von Kries conversion method, in order to convert the XYZ values under the standard white point W1 into the XYZ values under the standard white point W2, ratio conversion of W2'/W1' is performed in a human's color perception space PQR. If this method is applied to the Lab uniform color space, the Lab value under the standard white point W1 does not coincide with the Lab value under the standard white point W2. For example, if the XYZ values of a sample under the standard white point W1(X_W1, Y_W1, Z_W1) are assumed to (X1, Y1, Z1) and the XYZ values of a sample under the standard white point W2(X_W2, Y_W2, Z_W2) are assumed to (X2, Y2, Z2), the following relation can be obtained by the Von Kries conversion method.

$$\begin{pmatrix} X2 \\ Y2 \\ Z2 \end{pmatrix} = \begin{pmatrix} \\ inv\_Mat \\ \\ \end{pmatrix} \begin{pmatrix} P_w2/P_w100 \\ 0Q_w2/Q_w10 \\ 00R_w2/R_w1 \end{pmatrix} \begin{pmatrix} \\ Mat \\ \\ \end{pmatrix} \begin{pmatrix} X1 \\ Y1 \\ Z1 \end{pmatrix} \qquad \ldots (2)$$